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Which Reputations Does a Brand Owner Need?

Evidence from Trade Mark Opposition

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Abstract

At least two: the reputation of their brand and a reputation for being tough on imitators of this brand. Sustaining a brand requires both investment in its reputation amongst consumers and the defence of the brand against followers that infringe upon it. I study the defence of trade marks through opposition at a trade mark office. A structural model of opposition and adjudication of trade mark disputes is presented. This is applied to trade mark opposition in Europe. Results show that brand owners can benefit from a reputation for tough opposition to trade mark applications. Such a reputation induces applicants to settle trade mark opposition cases more readily.

JEL: K41; L00; O31; O34

Keywords: Trade marks, Opposition, Intellectual property rights, Reputation

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1 Introduction

Trade marks enable consumers to reliably distinguish amongst producers and branded goods.[1] In turn, this provides incentives for producers to differentiate products and build brand reputation. However, trade mark registration by itself cannot support this mechanism. Trade marks are passive rights: brands must be defended against imitation if trade marks are to be effective. Trade mark opposition provides a first line of defence for owners of established brands.

In trade mark opposition owners of existing trade marks (leaders) seek to protect these against infringement by similar trade mark applications of other firms (followers). The process is similar to litigation and therefore the question arises why firms often fail to settle disputes about similarity of trade marks ? I investigate this 'litigation puzzle' (Waldfogel (1998)) using data on trade mark opposition in Europe. The paper shows how a reputation for toughness in opposition helps brand owners to reduce the costs of defending a trade mark portfolio. It contributes to the literature on the 'litigation puzzle' by providing and estimating an empirical model of reputational effects when some parties litigate more frequently than others. The paper is also the first study of trade mark opposition. It contributes to a literature studying how costs of defending intellectual property rights affect their value to different kinds of firms (Lanjouw and Schankerman (2001), Lanjouw and Lerner (2001), Crampes and Langinier (2002), Harhoff and Reitzig (2004)). To date this literature focuses solely on patents. Finally, as Graham and Somaya (2006) note there is surprisingly little previous research on trade marks.[2] This paper shows how data from trade mark registration can be used to study this fundamentally important property right.

It is often said that imitation is the sincerest form of flattery; trade marks protect brand owners against such flattery. A registered trade mark protects a mark against exact imitation. If brand owners seek protection against use of similar marks, they must show their own trade mark is in use and is known by consumers. They must also establish that the follower's trade mark will confuse consumers. Greater brand reputation affords a trade mark more extensive protection only if it can be proven in court that a mark is well known among consumers (Phillips (2003)).

In a sufficiently large pool of registered trade marks, avoiding similarity between an application and existing trade marks becomes extremely costly. Trade marks may be considered similar in several dimensions, including visual, phonetic and meaning. Since brand owners are best placed to determine when a trade mark application becomes too similar to their brands many trade mark systems allow brand owners to oppose applications.[3] Trade mark opposition cases frequently pit firms against one another that have no connection in markets or technology. Then, leader and follower possess little information about one another and a reputation for aggressive opposition may be valuable to the leader. Such a reputation will suggest that the leader can produce good evidence for use and reputation of their brand. This is by no means a foregone conclusion as such evidence can be costly to produce. It is often necessary to survey consumers in several markets to provide good evidence of a reputation.

Drawing on Waldfogel (1998) I investigate whether models of divergent expectations or asymmetric information about case quality help to explain why leaders and followers fail to settle disputes about trade mark applications. Neither of these explanations fits trade mark opposition well. Rather, it emerges that firms which behave aggressively in opposition obtain favourable outcomes in later opposition cases. The hypothesis that reputation building allows trade mark owners to benefit from a tough stance in protecting their trade marks is the focus of this paper.

[1] In this paper trade marks are understood to be property rights which protect brands. A brand may be protected by several trade marks belonging to the same firm.

[2] Theoretical work on the role of trade marks and brands includes Perry and Groff (1986), Cabral (2000) and Choi (1998). Recent empirical studies which make use of trade mark data are Mendonca et al. (2004) , Greenhalgh and Rogers (2006) and Graham and Somaya (2006).

[3] The trade mark systems of the United States, Germany and of the Office for Harmonisation in the Internal Market (OHIM or simply the Office) all provide the possibility of opposition.

Such a tough stance is given if a brand owner builds a reputation for opposition of any trade mark applications similar to their own. Tough opponents are more likely to have previously invested in evidence proving use and reputation of their trade mark. Then followers, whose new trade mark is opposed, will anticipate higher costs in responding to the case made by the leader and may prefer to settle. Therefore, a reputation for toughness may lower the effective costs of defending a trade mark across several opposition cases.

This theory is tested on a comprehensive dataset of trade mark opposition cases from the Office for Harmonisation in the Internal Market (the Office)[4], which began to operate an trade mark system for the European Union in 1996. The Office offers an important and cheap way for firms to acquire trade mark protection throughout Europe. Between 1996 and 2004, there were over 400,000 applications for trade marks at this office of which over 225,000 were registered.[5] Opposition is an important feature of the trade mark system operated by the Office. More than 17% of all trade mark applications at the Office are the subject of at least one opposition.[6] Interviews with trade mark attorneys suggest a similar number of potential disputes is settled without opposition proceedings being started.

Table 1 shows the top 20 applicants at the Office between 1996 and 2004. Many come from countries outside the European Union. There is considerable heterogeneity in the number of oppositions that firms receive and generate relative to applications. A high ratio of oppositions generated to applications may reflect reputation building. For instance, the two most frequent opponents in this table have built a large and very homogeneous set of brands (Deutsche Telecom) and a globally unified set of brands (Unilever). In both cases use of similar trade marks by other firms could be very damaging, and a reputation for tough opposition advantageous.

Table 1: The top 20 applicants at the Office, 1996-2004
Applications, oppositions received and oppositions generated

Origin	Applicant	Applications	Oppositions received	Applications rejected	Oppositions generated
JP	KONAMI	1313	102	2	8
US	PROCTER & GAMBLE	1065	162	4	82
DE	DEUTSCHE TELEKOM	1035	345	18	240
US	MARS	897	215	18	196
DE	DAIMLER CHRYSLER	812	103	6	113
DE	REWE ZENTRAL	621	372	39	149
FR	L' OREAL	608	72	1	36
DE	BASF	570	113	10	85
NL	UNILEVER	490	110	1	235
FR	LANCOME	439	64	1	38
US	IBM	420	52	1	38
US	MICROSOFT	392	35	1	21
JP	SONY	372	73	2	49
DE	VOLKSWAGEN	360	78	6	46
DE	BMW	351	31	0	27
US	VIACOMINT	326	57	2	46
CH	SYNGENTA	325	132	8	141
DE	ALTANA	324	101	19	98
US	PFIZER	315	108	4	107
US	ELI LILLY	311	104	4	42

Trade marks registered at the Office exist side by side with national trade marks registered in Europe. As a consequence the pool of potential opponents to a trade mark application at the Office is especially large. Furthermore, the existence of different languages within this trade

[4]The abbreviation for this office is OHIM, but it refers to itself as the Office in its publications.

[5]The USPTO had a stock of 1,216,691 trade marks end of 2004. The annual number of trade mark applications at the USPTO was above 200,000 every year between 1996 and 2004. The German trade mark office (DPMA) had a stock of 716,123 trade marks end of 2004. The annual number of trade mark applications there was between 58,000 and 90,000 per year between 1999 and 2004.

[6]The level of opposition at the USPTO was below 5% in 2005 and the level of opposition at DPMA fell from 12% to 6% between 1999 and 2004.

mark system multiplies the possible forms of similarity beyond those that exist in national trade mark systems. These features suggest that opposition has a more important role to fulfil within the trade mark system administered by the Office than in national trade mark systems.

I present a model of selection into adjudication and of adjudication of trade mark disputes. From this a structural empirical model is derived which incorporates a selection and an outcome equation. Identification is based on measures of reputation for tough opposition and of asymmetry of stakes. The selection equation is jointly estimated with the outcome equation in a bivariate probit selection model. Theory indicates that the model will be affected by heteroscedasticity. Taking this into account the model is estimated by full information maximum likelihood (FIML).

The results of the empirical analysis support the theoretical model. They show that the leader's reputation for tough opposition has a strong effect on the probability that a trade mark opposition case will be settled. Measures of damage and trade mark value are shown to predict the decision of the Office in adjudication. In particular, it is shown that simple measures of string similarity applied to leaders' and followers' trade marks are good predictors of the damage which a follower's trade mark is likely to do to the leader's trade mark. These measures are also used to measure the leader's reputation for toughness in opposition.

The paper is organised as follows: Section 2 analyses firms' opposition strategies descriptively. Section 3 presents a theoretical model of opposition from which an empirical specification is derived. The data are described in Section 4. The effect of a leader's reputation for tough opposition on the probability of adjudication is estimated in section 5. Section 6 concludes.

2 Trade mark registration at the Office

This section describes the trade mark application process at the Office. First, the outcomes and the duration of the trade mark opposition process are described. Then, I show that neither divergent expectations nor one-sided asymmetric information help to explain the actions of parties in trade mark opposition. Using measures of string similarity I show that firms which oppose frequently are able to extract settlements in opposition cases against less similar trade marks than firms that oppose infrequently. This indicates that frequent opponents benefit from a reputation for tough opposition. The following sections build on this finding.

2.1 Applications, oppositions and registrations

This paper is based on an administrative dataset provided by the Office. It contains information on trade mark applications, trade mark applicants and opposition cases at the Office between 1996 and 2004 .

Table 2: Applications of trade marks and incidence of opposition at the Office

Status of trade mark applications	**Application Year** 1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Total applications	42,743	26,878	31,275	40,960	56,980	48,519	44,788	57,109	56,828	406,080
Unopposed	35,590	22,193	25,334	33,211	46,861	40,197	37,320	50,665	56,790	348,161
% of total	83.27	82.57	81.00	81.08	82.24	82.85	83.33	88.72	99.93	85.74
Opposed	7,153	4,685	5,941	7,749	10,119	8,322	7,468	6,444	38	57,919
% of total	16.73	17.43	19.00	18.92	17.76	17.15	16.67	11.28	0.07	14.26
Opposition cases*	9,531	6,252	8,112	10,492	13,487	11,094	9,662	8,277	42	76,949
Word mark cases**	4,575	5,310	7,743	10,117	12,808	10,001	8,270	5,907	6	64,737

* Distinguishes separate opposition cases against the same trade mark application.

** Count of opposed and opposing trade marks which are words.

Table 2 above displays the number of trade mark applications and the incidence of opposition to trade marks in the dataset. On the basis of this data it can be shown that on average 17.61% of trade mark applications received by end of 2002 were opposed at least once. Many of these applications received several oppositions. In the lower part of Table 2 the line 'Opposition cases' details the total number of opposition cases filed against applications of a given cohort. The line 'Word mark cases' shows opposition cases involving only trade marks consisting of words.

Measures of the similarity of trade marks in an opposition case contain important information about the quality of each case. I use measures of string similarity between word marks to this end. These measures can be derived for a subsample of opposition cases consisting of all oppositions between word marks concluded before the end of 2004. This subsample contains 42,433 opposition cases.

Before the opposition process can begin the Office will have examined a trade mark application. If the Office is satisfied that the application meets the requirements for a trade mark it will publish the application. Only then, are rival firms in a position to oppose.

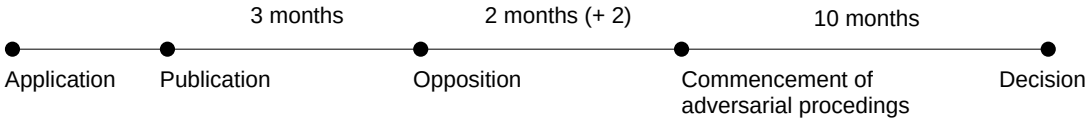

Figure 1: The trade mark opposition procedure

If there is an opposition, the ensuing opposition process has three phases illustrated in Figure 1. Firms must lodge their opposition with the Office within three months of publication. Thereafter the formal opposition process begins. Figure 1 indicates how long each phase should take according to the Office.[7] Leaders and followers can bargain over the trade mark application before and after notification of opposition. They may also withdraw from the opposition case at any time. The case is then closed by the Office.

Table 3: Outcomes of opposition cases decided by 2004

Outcome	**Adjudication decision**					
	No		**Yes**		**Total**	
	N	%	N	%	N	%
Leader wins	0	0	3,377	41,26	3,377	7,96
Leader loses	0	0	4,807	58,74	4,807	11,34
Settlement	34,249	100,00	0	0	34,249	80,71
Total	34,249	100,00	8,184	100,00	42,433	100,00

What outcomes do word mark opposition cases at the Office normally have? Table 3 shows the proportion of settled and adjudicated opposition cases at the Office which terminated before the end of 2004. The table shows that the "trial rate" for these cases at the Office is 19,3%. It also shows that of these, 58,7% are decided in favour of the follower.[8] 8% of word mark applications that are opposed fail. These data show that opposition is a significant risk for applicants at the Office. Even if an opposition case is eventually settled or won this may take a long time. Table 4 summarises how many years the entire trade mark application process takes by type of outcome.[9]

The left half of Table 4 focuses on failed applications while the right focuses on registered

[7] Table 4 further below shows that the entire process of opposition often takes longer than suggested here.

[8] Cases in which only part of a trade mark application is rejected are deemed to be "won" by the leader.

[9] This duration measures the difference between the date of the last status recorded by the Office and the filing date.

applications. In the Table eight types of opposition outcome are distinguished. The upper four are outcomes of adjudication while the remainder are variants of settlement.

Table 4: Duration in years of trade mark registration by outcome

Opposition outcome	Failed applications			Registered applications			Total		
	N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.
Adjudication outcomes									
Application rejected	1758	4.19	1.15	1	7.42	.	1759	4.20	1.15
Application rejected in part	550	4.68	1.16	989	4.60	1.18	1539	4.63	1.17
Opposition rejected	669	4.47	1.22	4138	4.27	1.27	4807	4.30	1.27
Opposition failed	15	4.26	1.62	64	2.99	1.16	79	3.23	1.34
Settlement outcomes									
Application withdrawn	11740	2.10	0.96		2.78	0.38	11743	2.10	0.96
Application limited	1206	3.31	1.23	12565	2.91	1.10	13771	2.95	1.12
Opposition withdrawn	676	3.55	1.39	8059	3.06	1.22	8735	3.10	1.24
Total	16614	2.65	1.37	25819	3.24	1.29	42433	3.01	1.35

Table 4 demonstrates that opposition cases take a long time to be resolved. On average an unopposed trade mark application takes 1.76 years to register from the date of filing. The vast majority of trade marks take this route. In contrast applications that encounter opposition are in the system for much longer. Conditional on opposition the average length of the application process depends largely on whether the parties come to an agreement or whether the Office makes a ruling. The top half of the table shows that opposition cases adjudicated by the Office took in excess of four years on average to end. Cases settled by the parties concluded on average after about three years.

Three types of cost are associated with trade mark opposition: administrative costs, costs due to the delay in the use of a trade mark and the costs of providing evidence. The administrative costs are minimal at 350 €. In contrast the costs of delay may be very substantial if the follower has already embarked on a marketing campaign to promote their trade mark. Another important source of costs in trade mark opposition is the provision of evidence to the Office. These costs can also be substantial. They are discussed in greater detail below. Since each party carries its own costs, neither the costs of delay, nor the costs of evidence can be shifted to the loser of a trade mark opposition case.

2.2 The motivation for opposition

Trademark opposition imposes significant delays and may lead to the rejection or amendment of trademark applications by the Office. Why then do the parties to trade mark opposition cases ever fail to settle their disputes? The question why legal disputes in general are ever adjudicated has been extensively analysed in theoretical and empirical work.[10] Additionally, determinants of patent litigation and -opposition have been studied empirically. [11] Surprisingly, there is no work on opposition to trademark applications in the literature. As I show below it is easier to generate information about the quality of trademark disputes than it would be for patents. Therefore, the analysis of trademark opposition is a promising subject on which to test theories which explain the incidence of litigation.

[10] Early work includes Png (1987), Bebchuk (1984) Priest and Klein (1984), Schweizer (1989) and Spier (1992). Empirical work on litigation includes Fenn and Rickman (1999), Waldfogel and Siegelmann (1999).

[11] This includes Lerner (1995), Lanjouw and Schankerman (2001), Somaya (2003), Harhoff and Reitzig (2004) and Lanjouw and Schankerman (2004).

Waldfogel (1998) surveys the empirical and theoretical literature on the "litigation puzzle". He derives predictions from asymmetric information (Bebchuk (1984)) and divergent expectations (Priest and Klein (1984)) theories of litigation and tests these empirically. Waldfogel shows that variation in uncertainty and in the value of cases leads to differences in selection for trail under the two theories: under divergent expectations selection is two sided: both very good and very bad cases settle. In contrast, under asymmetric information selection is one sided: only very poor cases settle. Additionally, divergent expectations theories suggest that selection should lead to a 50% win rate as uncertainty diminishes completely. This is not the case under one sided asymmetric information. Waldfogel (1998) finds information asymmetry often exists early on in trials, but dissipates with time.

Trade mark disputes revolve around the extent of the reputation which the opposing trade mark enjoys and the likelihood of confusion between the opposed and the opposing trade mark. The degree of similarity between two trade marks is easily observed. Therefore, a model of asymmetric information about the quality of an opposition case is unlikely to explain opposition to a trade mark application well. Additionally, the length of trade mark opposition cases does not favour such an explanation, as uncertainty about case quality will dissipate with time. In contrast, if a divergent expectations theory is applied a low level of uncertainty about case quality suggests that win rates should be close to 50%.

Table 3 shows that on average leaders win 41,3% of cases. While this may not seem close to 50%, a real test of divergent expectations models lies in the variation of win rates as uncertainty about the value of a dispute changes. Table 5 provides such a test. Here I distinguish between opposing word marks that are themselves registered at the Office, giving rise to 'inside opposition' and those that are not. On average trade marks registered at the Office will be more valuable than national trade marks because they are protected in a larger geographical area.[12]

Table 5: Opposition outcome by inside opposition

Opposition outcome	**Inside opposition***						**Test**	
	No		Yes		Total		Odds	Std.
	%	N	%	N	%	N	ratio	error
Adjudication outcomes								
Application rejected	4.17	1,236	4.06	523	4.13	1,759	0.97	0.052
Application rejected in part	3.85	1,141	3.09	398	3.62	1,539	0.80	0.047
Opposition rejected	12.82	3,805	7.78	1,002	11.30	4,807	0.57	0.021
Opposition failed	0.18	54	0.19	25	0.19	79		
Settlement outcomes								
Application withdrawn	26.37	7,824	30.44	3,919	27.60	1,743	1.22	0.028
Application limited	32.20	9,553	32.76	4,218	32.37	13,771	1.02	0.023
Opposition withdrawn	20.13	5,972	21.46	2,763	20.53	8,735	1.08	0.028
Total	100.00	29,585	100.00	12,848	100.0	42,433		

* 'Inside opposition' arises if the opposing trade mark is registered at the Office itself.

Table 5 shows three things: first, disputes involving leaders with inside trade marks are more likely to be settled than disputes involving leaders with outside trade marks. The odds ratio for 'Applications withdrawn' is significantly in excess of one. Second, the rate at which leaders win opposition cases approaches 50% if we compare outside to inside opposition. The percentage of applications partly or wholly rejected under 'inside opposition' is $7,15\%$ while the percentage of oppositions that fail or are rejected is $7,97\%$. In the absence of 'inside opposition'

[12] Greenhalgh and Rogers (2006) show that UK firms which have registered a trade mark at the Office have higher Tobin's q than UK firms which register national trade marks.

the percentage of oppositions rejected is much greater at 12%. Finally, selection affects mainly rejected oppositions and is therefore one sided. The odds ratio testing whether the proportion of oppositions rejected is the same under inside and outside opposition rejects the null hypothesis clearly. Similarly, the proportion of applications partly rejected also diminishes significantly. However, the proportion of cases in which the application is rejected is stable.

The difference in the trial rates between 'inside opposition' and 'outside opposition' indicates uncertainty about cases diminishes under 'inside opposition'. The convergence to 50% suggests that divergent expectations could explain the results set out in Table 5. In contrast, the finding that selection is one sided suggests a model of asymmetric information fits the data better than divergent expectations. However, as noted above, the length and relative simplicity of trade mark cases makes it hard to believe that asymmetry of information about case quality can persist in the context of trade mark opposition.

Additional light can be shed on the question which theory of litigation fits trade mark opposition better by considering measures of the quality of word mark disputes. I use similarity measures for word marks to investigate the quality of opposition to word mark applications. Table 6 shows how the similarity between the leaders' and followers' trade marks varies by opposition outcome. Similarity of trade marks is greater for both similarity measures set out in the Table if the measure takes a higher value. The similarity of word marks is measured with the help of two computer implemented algorithms (Levenshtein and Jaro Winkler) that calculate string distances. The Levenshtein algorithm used here produces values between -1 and 0, while the Jaro Winkler algorithm used produces values between 0 and 1. For both algorithms higher values indicate greater similarity. The algorithms are further discussed in Appendix 6.

Table 6: Similarity by inside opposition

Opposition outcomes	**Inside Opposition** Yes **Levenshtein**	**Jaro Winkler**	No **Levenshtein**	**Jaro Winkler**	Differences of means tests **p-values** Lev.	J.W.
Adjudication outcomes						
Application rejected	-0.23	0.82	-0.21	0.84	0.010	0.065
Application rejected in part	-0.20	0.84	-0.19	0.85	0.074	0.086
Opposition rejected	-0.26	0.87	-0.23	0.85	0.001	0.061
Opposition failed	-0.28	0.78	-0.26	0.79	0.287	0.795
Total	-0.25	0.80	-0.24	0.81		

Table 6 shows two things: first, the similarity of word marks is lower on average if opposition cases fail or are rejected. Second, the average similarity of trademarks is lower under inside- than outside opposition. As the p-values reported in the Table demonstrate these results are generally significant at the 10% level and in two cases even at the 1% level.

The first finding also holds for all word marks in the sample and is significant. While this finding is reassuring from the point of view of the Office - which rejects cases of lower quality on average - it is puzzling when we consider the leaders. Why do they pursue low quality cases? The second finding does not fit well with an asymmetric information model of word mark opposition. Such a model indicates that under inside opposition stronger cases should remain in the pool of cases that are adjudicated. Table 6 shows this is not the case.

One might explain the greater dissimilarity of word marks under inside opposition by appealing to the possibility that these word marks enjoy a greater reputation with consumers, which is correlated with their higher value to firms. Then, firms may be rational in pursuing worse looking cases on the similarity measures because they expect a greater degree of protection for their word marks.

This explanation suggests a further experiment: consider only first time opposition cases for opposing word marks in which the opposing word mark is only registered at the Office. Such opposing trade marks are likely to be quite young and therefore to have a comparatively lower reputation with consumers on average. Table 7 is based on first oppositions by inside trade marks without seniorities (previous registrations). In this table I distinguish between trade marks belonging to firms that have not been involved in opposition frequently and those that have.

Table 7 focuses only on the Levenshtein similarity measure as it provides very similar results to Jaro-Winkler in Table 6. A comparison of the first columns in Tables 6 and 7 reveals that on average the similarity of trade marks is greater in those cases in which the inside trade mark has no seniorities, has not been involved in opposition previously and in which the trade mark owner has not undertaken opposition on the basis of other trade marks very often, i.e. in Table 7. This indicates that opposing firms really are more conservative when the trade mark they own is less well established.

Table 7: Opposition cases based on new trade marks

Opposition status	**Preceding opposition activity** **low** Levenshtein	**N**	**high** Levenshtein	**N**	**Differences of means test** p-values
Adjudication outcomes					
Application rejected	-0,218	232	-0,177	21	0.147
Application rejected in part	-0,189	190	-0,265	12	0.053
Opposition rejected	-0,257	428	-0,336	32	0.010
Opposition failed	-0,243	15	.	0	
Settlement outcomes					
Application limited	-0,221	1934	-0,244	155	0.068
Application withdrawn	-0,205	1684	-0,249	174	0.001
Opposition withdrawn	-0,219	1322	-0,243	142	0.070
Total	-0,218	5817	-0,249	536	0.001

Table 7 also contains information on the behaviour of leaders who themselves will have a reputation for opposition, even if the trade mark their current case rests on is not well known. This reputation rests on the greater frequency with which they oppose trade mark applications of other firms. The table reveals that these leaders are not at all conservative when undertaking opposition cases. The p-values reported in Table 7 indicate that such leaders are significantly more aggressive than those who have little experience with opposition.

The combined evidence presented in Tables 6 and 7 indicates that it is not so much asymmetry of information about the quality of an opposition case that determines whether opposition cases are settled. Rather, it seems that experienced opponents have an advantage over inexperienced opponents in the process of opposition. This points to an explanation for litigation and opposition discussed in the literature on patents: Lanjouw and Schankerman (2001) argue that reputation building is a determinant of litigation in patent litigation cases. Analogously, the evidence presented here suggests that reputation of the trade mark owner might explain why frequent opponents oppose word marks that are significantly less like their own word mark than infrequent opponents. Since trade mark owners often oppose different applications to protect the same trade mark it is likely that investing in a reputation for aggressive opposition is valuable. In fact firms often seek to build reputations for being particularly tough in the defence of core trade marks as trade mark lawyers like to recount. Therefore, importance of reputation in trade mark opposition is further pursued in the empirical analysis of section 4.

3 A model of selection into adjudication

Here, I develop a model of selection into adjudication at a trade mark office. It encompasses the decision to oppose a rival firm's trade mark and the opposition process including adjudication. The model builds on Meurer (1989) and Lanjouw and Lerner (1998). It is assumed that reputation can be nurtured through repeated oppositions in defence of a trade mark portfolio. I model individual opposition cases taking account of effects of reputation and asymmetry of stakes. An empirical specification is derived which takes account of sample selection. The model provides a theoretical basis for variables that identify the selection equation.

In the model I distinguish between 'leaders' and 'followers'. The leaders are owners of established trade marks which support brand names. The followers are firms attempting to establish brands of their own. In applying for a new trade mark followers may have positioned their trade mark close to that of a leader. Then the leader may oppose the follower's application. If so, there are two possible outcomes: settlement or adjudication in which the Office determines whether a trade mark application is too similar to the leader's trade mark. In adjudication both parties are called upon to provide evidence. This process is modelled as a three stage game between the follower, the leader and the Office:

Stage 0 Nature provides the follower with a trade mark. The follower believes the trade mark to be sufficiently different from existing trade marks to apply for it.

Stage 1 The trade mark office examines the application and finds it to be similar to the leader's trade mark and inform them of this fact. The leader's trade mark has value V. The leaders anticipates damage D to her trade mark flowing from the follower's trade mark and decide whether to oppose or not. Simultaneously the follower chooses whether to uphold her application. Due to the similarity of the trade marks they now value their trade mark as $S = D + \epsilon$. Here $\epsilon \in [-\infty, +\infty]$ captures an asymmetry of stakes between leader and follower.

Stage 2 Under opposition, leader and follower bargain over a settlement. If settlement can be achieved the game ends. If settlement fails the leader faces a cost E of providing evidence to the office[13]. Simultaneously the leader builds a reputation for defending their trade marks. This generates an offsetting gain G which may bias the leader towards opposition. The follower faces a cost e of responding to the leader's evidence.

Stage 3 The trade mark office determines whether the follower's trade mark is too similar to the leader's, conditional on a legal standard $\bar{D}$.

The game is solved by backwards induction and subgame perfection is applied.

The value of the leader's trade mark (V) and the damage which will be caused by the registration of the follower's trade mark (D) are assumed to be known to both firms. While the value of the leader's trade mark will always be positive $(V > 0)$ I allow for the possibility that the damage inflicted by the follower's trade mark is actually a gain for the leader, i.e. $D \in [-\infty, \infty]$. This might occur if the follower's brands are better known than the leader's. While the damage D is assumed to be known to the firms, it is costly to provide evidence on the similarity of trade marks to the office ($E > 0, e > 0$).

The follower's gain from the similarity of the two trade marks may be larger or smaller than the damage inflicted on the leader. If $\epsilon > 0$ there is a net gain to both firms from registration of the new trade mark while $\epsilon < 0$ represents cases in which the damage to the leader exceeds the follower's gain.

[13] While the Office apportions the fees for an opposition procedure to the losing party, the costs of providing evidence during such a procedure cannot be recovered in the same manner.

Note, that here asymmetry of stakes refers to differences in the payoffs of the parties due to the differential impact of the trade mark application on profits of leader and follower. Here asymmetry of stakes is specific to the particular dispute and does not arise from differences in payoffs which are induced by reputational gains. Gains from one opposition case that arise in later cases are captured by the reputational gain (G). In the existing literature on litigation both kinds of asymmetry are subsumed under the heading of asymmetric stakes (Meurer (1989), Che and Yi (1993)). The distinction will matter as these forms of asymmetric stakes have different effects in equilibrium in this model.

3.1 Stage 3

If adjudication is reached, the trade mark office decide whether the follower's trade mark is too similar to the leader's. They will reject the follower's trade mark if the damage D it inflicts on the leader's trade mark exceeds the office's decision standard: $D > \bar{D}$. The standard at the trade mark office ($\bar{D}$) is imperfectly observed. In fact, I only observe the outcome of adversarial proceedings: define this as $y_o = 1$ if the leader wins. Correspondingly the office's standard is observed with error μ and the probability of the leader winning may be defined as:

$$\begin{aligned} \text{prob}(y_o = 1) &= \text{prob}(D > \bar{D} - \mu) \\ &= \text{prob}(\mu > \bar{D} - D) \\ &= \Phi(D - \bar{D}), \end{aligned} \tag{1}$$

where it is assumed that the error μ regarding the office's decision standard, is normally distributed and Φ represents the standard normal distribution. This leads to a probit model for the probability that the office reject the trade mark application in adversarial proceedings. The difference $D - \bar{D}$ can be represented as a linear function of variables that determine the level of damage and of variables that determine the decision standard.

The value of the leader's trade mark will depend on its ability to positively affect purchasing decisions, called *goodwill*.[14] Where a trade mark can be shown to possess a high degree of goodwill it will be more likely that a follower's trade mark can be shown to be free riding on- or damaging to it. Then the Office is more likely to reject the follower's trade mark. Therefore, I assume that the decision standard is a decreasing function of the value of the leader's trade mark and that the probability of successful opposition is decreasing in the decision standard:

$$\frac{\partial \text{prob}(y_o = 1)}{\partial \bar{D}} < 0 \qquad\qquad \frac{\partial \bar{D}(V)}{\partial V} < 0 \tag{A1}$$

This implies more valuable trademarks are more easily defended in opposition: $\frac{\partial \text{prob}(y_o=1)}{\partial V} > 0$.

This probit model implicitly generates a probability that the follower's trade mark is too similar to the leader's trade mark, $\hat{p}(D, \bar{D}(V))$. This is conditional on the value of the leader's trade mark and the level of damage which the follower's trade mark might inflict. I impose the following conditions on $\hat{p}$:

$$\frac{\partial \hat{p}}{\partial D} > 0, \qquad\qquad \frac{\partial \hat{p}}{\partial \bar{D}} < 0 \tag{A2}$$

i.e. the probability increases in the degree of damage and decreases in the decision standard. $\hat{p}(D, \bar{D})$ is assumed to be known to both firms. This rules out the possibility of disagreement between them which arises from divergent expectations about the merits of a trade mark dispute.

[14] Note that this definition of goodwill is specific to trade mark law and differs from the accounting definition of goodwill.

3.2 Stage 2

Given their knowledge of the merits of the trade mark dispute, leader and follower will bargain over the distribution of the joint surplus from the follower's trade mark application. The surplus is: $(1-\delta)^{-1}(V+\delta\tilde{\epsilon})$ where $\tilde{\epsilon}=\max[0,\epsilon]$. This is the discounted stream of the leader's value from their trade mark and the discounted difference between the leader's loss and the follower's gain from the new trade mark. δ is the discount rate. If $\epsilon>0$ the trademark application adds value and the parties will negotiate how to split this value. If $\epsilon<0$ the trademark application destroys value and the parties negotiate at which price it is dropped.[15]

If one of the parties withdraws from bargaining, adversarial proceedings ensue. The parties' outside options are defined by their expected value of adversarial proceedings:

$$A_l = V+\frac{\delta}{(1-\delta)}\hat{p}(D,\bar{D})V+\left(1-\hat{p}(D,\bar{D})\right)\left[\frac{\delta}{(1-\delta)}(V-D)\right]-\delta\left(E-G\right) \quad , \tag{2}$$

$$A_f = \frac{\delta}{(1-\delta)}(1-\hat{p}(D,\bar{D}))(D+\epsilon)-\delta e \quad . \tag{3}$$

The leader's payoff from adversarial proceedings consists of the return V during the proceedings, and the expected value of the result of the proceedings net of the costs of providing evidence (E). During adversarial proceedings the follower receives nothing. They anticipate a value from the new trade mark, if that is not rejected. Additionally they face a cost of providing evidence at trial equivalent to e. If their trade mark application is rejected the follower has a payoff of zero.

The parties' disagreement point is defined by their payoffs during the bargaining process. The follower receives nothing in this period while the leader continues to enjoy the full benefit of their trade mark, V. By the outside option principle (Binmore (1985), Binmore et al. (1989)) the leader's expected payoff (v_l^2) is:

$$v_l^2=\begin{cases}\frac{1}{2}((V+\delta\tilde{\epsilon})(1-\delta)^{-1}+V) & \text{if } \frac{(V+\delta\tilde{\epsilon})}{2(1-\delta)}\geq A_l \quad \text{and} \quad \frac{(V+\delta\tilde{\epsilon})}{2(1-\delta)}\geq A_f \\ (V+\delta\tilde{\epsilon})(1-\delta)^{-1}-A_f & \text{if } \frac{(V+\delta\tilde{\epsilon})}{2(1-\delta)}\geq A_l \quad \text{and} \quad \frac{(V+\delta\tilde{\epsilon})}{2(1-\delta)}< A_f \\ A_l & \text{if } \frac{(V+\delta\tilde{\epsilon})}{2(1-\delta)}< A_l \quad \text{and} \quad \frac{(V+\delta\tilde{\epsilon})}{2(1-\delta)}\geq A_f \quad .\end{cases} \tag{4}$$

where it is assumed that both parties are equally impatient and the delay between offers and counter offers is zero. This has the implication that both parties have equal bargaining power and the joint surplus is split evenly between them if the outside option constraints do not bind.

By the same principle the follower's expected payoff (v_f^2) is:

$$v_f^2=\begin{cases}\frac{1}{2}((V+\delta\tilde{\epsilon})(1-\delta)^{-1}-V) & \text{if } \frac{(V+\delta\tilde{\epsilon})}{2(1-\delta)}\geq A_l \quad \text{and} \quad \frac{(V+\delta\tilde{\epsilon})}{2(1-\delta)}\geq A_f \\ A_f & \text{if } \frac{(V+\delta\tilde{\epsilon})}{2(1-\delta)}\geq A_l \quad \text{and} \quad \frac{(V+\delta\tilde{\epsilon})}{2(1-\delta)}< A_f \\ ((V+\delta\tilde{\epsilon})(1-\delta)^{-1}-A_l & \text{if } \frac{(V+\delta\tilde{\epsilon})}{2(1-\delta)}< A_l \quad \text{and} \quad \frac{(V+\delta\tilde{\epsilon})}{2(1-\delta)}\geq A_f \quad .\end{cases} \tag{5}$$

Settlement between the parties is now fully characterised. Due to a possible reputation gain from adjudication for the leader, leader and follower may be unable to settle:

$$A_l+A_f>\frac{1}{(1-\delta)}(V+\delta\tilde{\epsilon})\Leftrightarrow G>E+e+\left[(\tilde{\epsilon}-\epsilon)+\epsilon\hat{p}(D,\bar{D})\right]\frac{1}{1-\delta} \quad . \tag{6}$$

This inequality shows that the reputation gain for the leader must be larger than the sum of both parties' costs of adjudication for the leader to prefer adjudication. Additionally, it depends on

[15] In this model parties may settle on the expected outcome from a court decision. This option is not considered in Meurer (1989) due to restrictions on the type of contract which firms may adopt that derive from competition law. Such restrictions do not apply to trade marks. Cf. Phillips (2003) (pp. 507-8).

the extent of asymmetric stakes between the parties. If $\epsilon > 0$, then the first term in square brackets is zero and an increase in asymmetric stakes decreases the probability of adjudication. This reflects the increase in surplus which both parties can divide if they settle. If $\epsilon \leq 0$, then the term in square brackets becomes $-(1-\hat{p})\epsilon > 0$. Once more, an increase in asymmetry of stakes reduces the probability of observing adjudication. In this case this reflects the decreasing gain for the follower from their trademark application. Note that in this model increases in asymmetric stakes (ϵ) *reduce* the likelihood of litigation.

Condition (6) characterises the boundary between the settlement and the adjudication region as long as $A_f > 0$. Leader and follower must be adequately compensated if they settle.

3.3 Stage 1

Here the leader must decide whether to oppose or not. Simultaneously, the follower who is appraised of the looming trademark dispute must determine whether to uphold their application. First, I consider whether the follower will prefer to withdraw their application if faced with the threat of opposition. Thereafter the leader's choice to oppose is analysed.

The follower's decision The follower anticipates whether the threat of opposition leads to a settlement or to adversarial proceedings. In the case of settlement they will always weakly prefer this to abandoning their trade mark application as settlements are worth at least 0 to the follower. In the case of adjudication it is less clear whether the follower is likely to pursue an application.

Anticipating the possibility of adjudication a follower must choose whether to enter opposition or not. They will receive a payoff of 0 if they withdraw their application and will prefer adjudication if $A_f > 0$. Note that $A_f > 0$ implies either an adversarial setting: $D > -\epsilon$ and $\epsilon < 0$ and $D > 0$,a cooperative setting: $\epsilon > -D$ and $\epsilon > 0$ and $D < 0$ or $D > 0$ and $\epsilon > 0$, a highly cooperative setting. In the adversarial setting the follower damages the leader's trade mark, derives a gain from the similarity of their trade marks but cannot compensate the leader fully. In the cooperative settings the follower creates a benefit for the leader and gains from the similarity of both trade marks. A limit for the adjudication region can be derived as follows:

$$\delta A_f > 0 \Leftrightarrow D > e\frac{(1-\delta)}{(1-\hat{p}(D,\bar{D}))} + (-\epsilon) \quad . \tag{7}$$

This inequality shows that the follower will withdraw their trade mark application if the probability of losing in adjudication is high enough. Greater costs of providing evidence (e) decrease the follower's willingness to pursue an application that will end in adjudication. On the other hand an increase in the spillover from the leader's trade mark (D) raises the follower's willingness to uphold a trade mark application facing adjudication.

The leader's decision It can be shown that a leader will always oppose if they anticipate adjudication. The leader will prefer adjudication if $A_l > (V - \delta D)(1-\delta)^{-1}$. By rewriting the condition characterising the adjudication region (6) I can show that if adjudication is preferred to settlement, opposition is always more profitable than accommodating the follower:

$$A_l + A_f > \frac{V + \delta\tilde{\epsilon}}{1-\delta} \Leftrightarrow A_l > \frac{V - \delta D}{1-\delta} + (D+\epsilon)\frac{\delta\hat{p}(D,\bar{D})}{1-\delta} + \frac{\delta}{1-\delta}(\tilde{\epsilon} - \epsilon) + \delta e \quad . \tag{8}$$

Note that all terms on the right hand side of this inequality are positive. Therefore, adjudication arises if both conditions (6) and (7) hold simultaneously; then the leader cannot be persuaded to end opposition and the follower does not wish to withdraw their application.

3.4 Predictions of the model

This model shows that determinants of the outcome of adversarial proceedings also affect the selection process into adversarial proceedings. I wish to characterise both the determinants of successful opposition and those of settlement in the population of opposed trade mark applications. To do this the dependence of selection into adjudication and adjudication outcomes must be incorporated in the econometric model.

Therefore, the correct empirical specification in which to test the predictions of this model is a sample selection model. The outcome equation of this model has been specified in section 3.1. Conditional on the follower's decision to uphold their application the selection equation can be derived from inequalities (6) and (7) which jointly characterise the adjudication region.

The outcome equation The hypotheses to test in the outcome equation are contained in assumptions (A1) and (A2):

Hypothesis 1
Greater damage to the leader's trade mark raises the probability that the trade mark office will reject the follower's trade mark application,

and

Hypothesis 2
A higher value of the leader's trade mark raises the probability that the trade mark office will reject the follower's trade mark application.

These hypotheses test whether the Office really adjudicate trade mark opposition cases on the basis of the criteria set out in their guidelines (OHIM (2004)).

The selection equation The probability of observing adjudication depends on the parties' choice between settlement and adjudication, as well as the follower's preceding decision to uphold their application in the face of opposition. Figure 2 represents the adjudication region that results from both decisions in E-D space:

The boundaries, E^* and D^*, of the adjudication region are derived from (6) and (7):

$$E^* = G - e - \left[(\tilde{\epsilon} - \epsilon) + \epsilon\hat{p}(D, \bar{D})\right]\frac{1}{1-\delta} \qquad D^* = e\frac{(1-\delta)}{(1-\hat{p}(D,\bar{D}))} + (-\epsilon) \quad . \tag{9}$$

If the area of the adjudication region in E-D space increases this implies that the probability of observing adjudication increases.

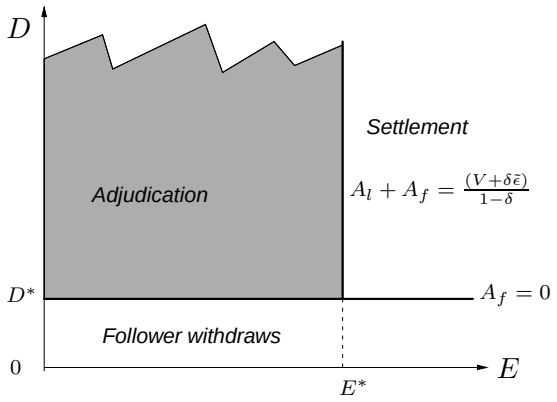

Figure 2: The adjudication region in E-D space

This model predicts both selection into opposition and the choice between settlement and litigation which is jointly made by leader and follower. The dataset to which the model is applied only contains observations for which the decision to oppose has already been taken. In the context of litigation the equivalent would be a dataset covering litigated cases but omitting cases which are settled between parties before the case ever reaches a court. It is conceivable that the inability to observe such settlements gives rise to a sample selection problem. This problem affects any study of litigation or disputes that relies only on institutional data. The problem may be neglected to the extent that we are interested in the population of opposition cases (litigation cases) and not so much in the population of all possible disputes and disagreements, no matter how small they might be.

Since the decision to enter opposition is not observed I derive the selection equation of the model from equation 6. I introduce a composite error term η which captures random shocks in the determinants of the costs of adjudication which the leader is still willing to bear, E^*. Then the probability of adjudication may be defined as:

$$\begin{aligned} \text{prob}(y_a = 1) &= \text{prob}(G - e - \left[(\tilde{\epsilon} - \epsilon) + \epsilon\hat{p}(D, \bar{D})\right] \frac{1}{1-\delta} > E^* - \eta) \\ &= \Phi(G - e - \left[(\tilde{\epsilon} - \epsilon) + \epsilon\hat{p}(D, \bar{D})\right] \frac{1}{1-\delta} - E^*), \end{aligned} \tag{10}$$

where it is assumed that the error η, is normally distributed and Φ represents the standard normal distribution. This leads to a probit model for the probability of adjudication.

The model provides several reasons to expect that η is affected by heteroscedasticity. The first derives from the multiplication of $\hat{p}$ and ϵ in the above specification. If either of these variables is affected by unmeasured random shocks these will be components of η and this will induce heteroscedasticity. Additionally, any heteroscedasticity affecting the error of the outcome equation μ (Equation (1)) will also affect η in Equation (10) as the selection equation incorporates firms' expectation of $\hat{p}(D, \bar{D})$.

Several hypotheses follow directly from equation (10) above:[16]

Hypothesis 3
The probability of adjudication is decreasing in the probability, $\hat{p}(D, \bar{D})$, that the trade mark application is rejected by the Office.

And that:

Hypothesis 4
The probability of adjudication is decreasing in the leader's and follower's expected costs of providing evidence: E and e.

And finally, that:

Hypothesis 5
The probability of observing adjudication is increasing in the reputation gain, G, which the firm obtains from opposition.

The empirical model Hypotheses 1- 5 can be tested by joint estimation of the outcome and the selection equations outlined here. In order to allow for selection into adjudication a bivariate sample selection model is required. In the outcome equation the leader's probability of winning (y_o) is a linear function of vectors of observed measures of expected damage ($\boldsymbol{D}$) and value ($\boldsymbol{V}$),

[16] Additional hypotheses not testable in this dataset may be derived from the model.

viz. equation (1). I also include control variables ($\boldsymbol{C}_o$) such as time- and experience dummies to control for decreasing uncertainty about opposition at the Office as time passes.

In the selection equation the probability of observing adjudication (y_a) is a linear function of vectors of observed measures of expected damage ($\boldsymbol{D}$), value ($\boldsymbol{V}$), reputation ($\boldsymbol{R}$) as well as measures of reputation gain (G). The sample selection model is identified by the reputation ($\boldsymbol{R}$) and reputation gain (G) variables. This model also contains control variables ($\boldsymbol{C}_s$) such as time- and experience dummies. Therefore, the estimated model has the form:

$$
\begin{aligned}
y_o^* &= \beta_0 + \boldsymbol{D}'\beta_D + \boldsymbol{V}'\beta_V + \boldsymbol{C}_o'\beta_C + \mu \\
y_a^* &= \gamma_0 + \boldsymbol{D}'\gamma_D + \boldsymbol{V}'\gamma_V + \boldsymbol{R}'\gamma_R + \gamma_G G + \boldsymbol{C}_s'\gamma_C + \eta \\
y_o &= \begin{cases} 1 & \text{if} \quad y_o^* > 0 \\ 0 & \text{if} \quad y_o^* \leq 0 \end{cases} \\
y_a &= \begin{cases} 1 & \text{if} \quad y_a^* > 0 \\ 0 & \text{if} \quad y_a^* \leq 0 \end{cases}.
\end{aligned}
\tag{11}
$$

This bivariate probit selection model can be estimated by FIML.

4 Data

In this section variables entering the empirical model are discussed. Table 8 sets out descriptive statistics for the sample of word mark opposition cases already introduced in section 2. [17]

The dependent variables The dependent variable for the selection equation, *Adjudication*, is a dummy capturing whether or not an opposition case ended in adjudication. Where *Adjudication* is zero this could be due to settlement between the parties or a withdrawal of the trade mark by the follower. In the data these alternatives are not clearly distinguished. The unconditional probability that an opposition case enters adjudication is 0.193. This is much higher than for opposition at the EPO (Harhoff and Reitzig (2004)) or opposition to trade marks at the USPTO.

The dependent variable for the outcome equation, *Leader wins* , is also a dummy variable. It takes the value one if the follower's trade mark was rejected either wholly or in part. Conditional on entry into adversarial proceedings the probability that the leader wins is 0.413.

***V*: The value of the leader's trade mark** Direct measures of trade mark value do not exist in the dataset. As the valuation of trade marks is not a trivial matter (Smith (1997)) this is not surprising. However, if trade marks are more valuable, then it is likely that their owners treat them in identifiable ways. The dataset contains several variables that capture aspects of the value of the leader's trade mark.

The variable *Inside opposition*, is used as an indicator for greater value of the opposing trade mark. As noted in Section 2.2 above, a leader's trade mark registered at the office will have a higher value than a leader's national trade mark, ceteris paribus. Table 8 shows that 30.3% of opposing trade marks are registered as a community trade mark (CTM) by their owners by the time they are used as a basis for an opposition.

The variable *Oppositions* measures the number of concurrent oppositions that a trade mark application faces. Higher values of this variable indicate that the follower has located their

[17] Several of the variables set out below depend implicitly on the identification of firms as entities. Firm names in this dataset were cleaned using do-files provided by Bronwyn Hall. Additionally the largest 250 firms were further consolidated by hand.

trade mark in a larger group of similar, preexisting trade marks. Such groups will arise where the preexisting trade marks have clustered around a source of value, for instance a particularly valuable market. 39.7% of all opposed trade marks face at least two leaders.

Table 8:Variable definitions and descriptive statistics

Variable		Description	Mean	Std. dev.	Min.	Max.	Obs.
Leader wins		Outcome dummy	0.413		0	1	8184
Adjudication		Selection dummy	0.193		0	1	42433
Inside opposition	$\boldsymbol{V}$	Opposing mark is CTM	0.303		0	1	42433
Oppositions	$\boldsymbol{V}$	Concurrent oppositions	1.699	1.248	1	20	42433
Opposition intensity	$\boldsymbol{V}$	Leader's previous oppositions	1.872	3.335	1	88	42433
Jaro Winkler	$\boldsymbol{D}$	Similarity measure	0.824	0.186	0	1	42433
Levenshtein	$\boldsymbol{D}$	Similarity measure	-0.233	0.178	-1	0	42433
Rivalry dummy			0.083		0	1	42433
Rivalry	$\boldsymbol{D}$	Product market overlap	0.147	0.226	0	1	38930
Seniorities	$\boldsymbol{D}$	Follower's Seniorities	0.363	2.266	0	116	42433
Follower's words		Words in follower's mark	1.398	0.662	1	5	42433
Leader's words	$\boldsymbol{D}$	Words in leader's mark	1.273	0.570	1	5	42433
Goods & services		Follower's Nice classes	3.015	3.514	0	42	42433
Low stakes		Weakness of leader's stakes	8.570	28.805	1	406	42433
Dummy 13		Leader's first three oppositions	0.619	0.486	0	1	42433
Dummy 46		Leader's next three oppositions	0.118	0.322	0	1	42433
Levenshtein 13	$\boldsymbol{R}$	Similarity in oppositions 1-3	-0.060	0.108	-0.726	0	42433
Levenshtein 46	$\boldsymbol{R}$	Similarity in oppositions 4-6	-0.051	0.110	-0.736	0	42433
Adjudication 13	$\boldsymbol{R}$	Adjudicated cases in 1-3	0.261	0.603	0	3	42433
Adjudication 46	$\boldsymbol{R}$	Adjudicated cases in 4-6	0.236	0.576	0	3	42433
Opposition lag	$\boldsymbol{G}$	Frequency of oppositions	-5.926	23.549	-256.607	113.619	42432
Follower size		Total applications end 2004	49.364	153.531	1	1417	42433
Leader size		Total oppositions end 2004	16.532	52.219	1	420	42433
Dum 9699		Year dummy 96-99[18]	0.048		0	1	42433
D2000		Year dummy	0.119		0	1	42433
D2002		Year dummy	0.237		0	1	42433
D2003		Year dummy	0.200		0	1	42433
D2004		Year dummy	0.197		0	1	42433

Finally, more valuable trade marks will be protected more vigorously by their owners. Under the maintained assumption that similarity of trade marks is largely random, this will lead to more opposition cases based on valuable trade marks. The variable *Opposition intensity* is a count of how often a trade mark has previously been the basis for an opposition by the leader. On average opposing trade marks have appeared in 1.87 previous opposition cases.

***D*: Damage created by the follower's application** Opposition against a trade mark application may be lodged if a firm believes the follower's trade mark will be confused with- , will damage- or is seeking to take unfair advantage of their trade mark and its reputation (Phillips (2003)). Every registered trade mark enjoys absolute protection against identical copies. Where a follower's trade mark is not identical a leader may nonetheless be able to prove that its registration will damage their trade mark(s). In examining such cases the Office will take into account both overlap in goods and services covered by the trade marks and their similarity.

The similarity of trade marks should be assessed on the basis of visual, aural and conceptual similarity according to the decision of the European Court of Justice (ECJ) in the landmark case

[18]There are so few observations before 1999 that I have subsumed these all into one variable.

of Sabèl v Puma[19]. Additional elements that are considered by the Office are the reputation of the leader's trade mark, which is correlated with its value and the sophistication of the affected group of consumers as well as the possible coexistence of the trade marks in some markets and any evidence of actual confusion on the part of consumers (OHIM (2004), Chapter 2.).

I have no measures of consumers' sophistication or confusion. However, the names of the trade marks in a dispute are known, which allows us to assess their similarity. The ECJ's decision in Sabèl v Puma implies that the Office will take into account the visual similarity of the strings (e.g. RESVIN and RESVERIN), their phonetic similarity (e.g. PHOTONICA and PHOTOKINA) and possible similarity of meaning (e.g. CINCO OCEANOS and 5 OCEANS). Similarity is measured using string similarity in this paper. This mostly captures the first of the aspects noted above and sometimes the second. Similarity of meaning is not measurable in this way.

Specifically, I use two algorithms to capture similarity of strings: the *Levenshtein* and the *Jaro Winkler* algorithms which result in similarity measures of the same name.[20] These two algorithms which are used in computer science and computational biology (Gusfield (1997), Navarro and Raffinot (2002)) represent slightly different methods of capturing the similarity of word marks: the Levenshtein algorithm measures similarity on the basis of operations in the transformation of one string into another while the Jaro Winkler algorithm measures similarity on the basis of common elements in both strings. The precise definition of these algorithms and their relation to one another is further discussed in Appendix 6. Both capture an aspect of the likelihood that consumers will confuse the two trade marks, damaging that of the leader.

The variable *Rivalry* captures product market rivalry between firms in an opposition case. Ceteris paribus, an increase in rivalry between two firms will increase the damage caused by similar trade marks held by the firms. *Rivalry* is defined as the uncentered correlation coefficient[21] between two vectors, which characterise the distribution of leader's and follower's trade marks over different product markets at the time of an opposition case. Here the product market measure is based on the 45 Nice classes that underlie the Nice classification system for trade marks. This system is used to classify for which kinds of goods and services a trade mark owner seeks protection. The underlying vectors for the measure are constructed as a list of counts of the number of trade marks that a firm has applied for in each Nice class. Table 8 shows that the measure is not available for opposition cases in which the leader has not applied for a trade mark at the Office. These cases are captured by the *Rivalry dummy*.

Leader's words and *Follower's words* measure the words in each trade mark. Ceteris paribus, a higher number of words, lowers the damage caused by similarity of parts of two marks.

Seniorities measures the number of identical previous registrations in other jurisdictions of a follower's trade mark. As these increase it is more likely that a group of consumers is already confronted with both the leader's and the follower's trade marks. Then it is harder to prove that the follower's trade mark will confuse consumers of products protected by the leader's mark.

***R*: Reputation** In the process of trade mark application leaders and followers are generally paired together at random. 10% of opposition cases in the dataset involve two parties that have had at least one previous dispute and only in 3% of cases do two parties have more than three encounters altogether. Furthermore the incidence of repeat encounters is decreasing over time. This suggests that a proportion of the repeat encounters observed are the result of conflicts between well established trade mark families from different countries. Such conflicts were more likely in the phase after the opening of the Office.

[19] Sabèl v Puma AG, Rudolf Dassler Sport, Case C-251/95 [1998] ETMR 1.

[20] To calculate the similarity of leader's and follower's trade mark in the dataset I employed *Secondstring*, an open source java toolkit described by Cohen et al. (2003).

[21] This measure used by Jaffe (1986) and in subsequent work on patents to measure similarity of firms' patent portfolios.

In this period followers will have had little information on which to base their expectation of the strength of the leader's evidence. A leader's reputation for aggressive defence of their trade mark portfolio provides important information to followers. It implies that a leader has invested in collection of evidence which may be relevant to the current trade mark dispute[22]. Such evidence raises the costs of defending a trade mark application for the follower.

To provide evidence in trade mark opposition cases leaders must regularly survey the public in order to demonstrate that their trade mark is well known. Legal representatives of trade mark owners therefore assemble "Fame packs" which document the reputation of valuable trade marks. These are regularly updated. Surveying the public regarding the reputation of a trade mark is expensive: such surveys may cost in excess of $15,000$ € [23].

The variables *Levenshtein 13* and *Levenshtein 46* capture the average similarity of leaders' and followers' trade marks in the first three and subsequent three opposition cases which a leader started. Higher values indicate that past trademark disputes were about more similar trademarks: the variables measure leading firms' past aggressiveness. Aggressive firms will have built up strong evidence for the reputaton of their trademarks which should raise the costs of defending an application in ongoing cases. I focus on early opposition cases since it has been shown in other settings that reputations in repeated games are established early on in a sequence of repeated interactions (Livingston (2005)).

The variables *Adjudication 13* and *Adjudication 46* control for the proportion of opposition cases out of the first three - and subsequent three oppositions that were adjudicated. Table 8 indicates that the trial rate amongst the first three cases brought by a leader is significantly higher (26.1%) than the unconditional trial rate ($19,3\%$) reported in Table 3 above. Higher trial rates will reduce leaders' costs of opposition later on, as they will have accumulated much of the evidence necessary to prosecute trials. Therefore, leader's costs of trials (E) should decrease as *Adjudication 13* and *Adjudication 14* increase.

G: Reputation gain The variable *Opposition lag* measures the difference of lags between opposition cases started by the leader. If the leader is building a reputation for aggressive opposition, then we may expect a quick succession of opposition cases. In contrast, if the leader perceives a low reputation gain from opposition, the probability that any specific application will be opposed falls and so does the lag between opposition cases. Therefore, I construct the average lag between past opposition cases and subtract from this the lag between the current opposition case and the most recent case. This variable increases as the interval between disputes falls, capturing increased frequency of opposition.

C: Control variables The regressions reported below all contain time dummies which capture variation in uncertainty about the procedures adopted by the Office. Additionally, I control for growing experience of the leader through the dummy variables *Dummy 13* and *Dummy 46*. These capture the first three and next three opposition cases brought by a leader, respectively. $26,3\%$ of opposition cases are brought by leaders with more than six previous opposition cases to their name. The variable *Goods & services* captures the breadth of the follower's application in the space of NICE classes. This variable controls for heterogeneity in the breadth of trade marks.

The variable *Low stakes* measures the number of other trade marks a leader has previously defended in trade mark opposition cases. The greater this number the lower the importance of

[22] In opposition cases that are not based on allegations of identity leaders need to demonstrate that their trade marks are i) used and ii) well known to the public in a specific market and iii) that the follower's trade mark will damage the reputation of their own trade mark in that market.

[23] This figure was quoted by the representative of a law firm with extensive experience in European trade mark practice.

the current opposition case for the leader. The variable does not measure asymmetry of stakes (ϵ) but controls for an element of diverging stakes between leader and follower.

Finally *Follower size* and *Leader size* control for the size of both parties. *Follower size* measures the follower's total trade mark applications at the end of 2004. *Leader size* measures the total number of opposition cases which a leader was involved as leader at end of 2004.

5 Effect of reputation on entry into adversarial proceedings

Firms with large trade mark portfolios invariably acquire a reputation for the manner in which they look after their portfolio. Interviews with trade mark practitioners show that firms likely to settle trade mark disputes and firms that vigorously protect their trade marks are well known for this behaviour. What then, is the effect of leaders' reputations on the outcome of a given trade mark dispute? Does a firm's reputation for aggressive trade mark opposition benefit it?

The theoretical model developed in section 3 predicts that followers' costs of providing evidence in trade mark opposition, e, will have a negative effect on their propensity to pursue adjudication. If a leader's reputation for aggressive opposition behaviour raises the expected value of the follower's costs of providing evidence, then followers facing aggressive leaders should settle trade mark disputes more often. To test the importance of this reputational mechanism a sample selection model (Equation 11) is estimated taking account of possible heteroscedasticity.

First, I estimate outcome and selection equations independently allowing for heteroscedasticity. The comparison of homoscedastic and heteroscedastic specifications reported in Table 9 indicates heteroscedasticity is present in both parts of the model. Although the estimates for the outcome equation are affected by selection bias the results provide a useful point of comparison to the sample selection model. Results for the sample selection model are set out in Table 10. There I also provide estimates from a sample selection model excluding heteroscedasticity.[24]

Table 10 shows strong evidence for selection in trade mark opposition. The outcome equation in the sample selection model is identified by variables capturing the effects of reputation for aggressive opposition in the past: *Levenshtein 13, Levenshtein 46, Adjudicated 13 and Adjudicated 46*. Additional identifying restrictions result from *Low stakes* and the measure of frequency of oppositions, *Opposition lag*. Apart from *Opposition lag* these variables are all highly significant. Additionally, the measure of correlation (ρ) between the error terms of the outcome and the selection equations is positive and highly significant. This shows that there is sample selection. A likelihood ratio test comparing the sample selection model with heteroscedastic errors to the restricted sample selection model with homoscedastic errors clearly rejects the restricted model ($\chi^2_{11} = 443.8$). Therefore, the following discussion focuses on the sample selection model with heteroscedastic errors reported in columns (3) and (4) of Table 10.

The results reported there strongly support the theoretical model. In particular, none of the hypotheses derived from the theoretical model can be rejected. Coefficients on which the hypotheses are tested are generally highly significant and their signs are stable across the different models. This indicates that the underlying model is quite robust.

Note that the presence of heteroscedasticity in a model with discrete dependent variables implies that the marginal effects and coefficients do not necessarily bear the same sign (Greene (1996)). Therefore, Table 12 reports the most important marginal effects for the sample selection model with heteroscedastic errors.

[24] All models reported in these tables were estimated by ML and FIML using LIMDEP 7. All models but the sample selection model allowing for heteroscedasticity were also estimated using STATA 9.2 . The results reported by both packages are identical.

Table 9: Independent probit models for outcomes of and selection into adjudication

		Pr(Leader wins)		Pr(Adjudication)	
Independent		**Homoskedastic**	**Heteroscedastic**	**Homoskedastic**	**Heteroscedastic**
variable		(1)	(2)	(3)	(4)
Levenshtein	D	1.101***	1.230***	-0.322***	-0.390***
		(0.111)	(0.154)	(0.044)	(0.051)
Jaro Winkler	D	0.629***	0.584***		
		(0.123)	(0.139)		
Rivalry dummy		-0.049	-0.101	0.009	0.020
		(0.050)	(0.082)	(0.027)	(0.031)
Rivalry	D	0.821***	1.140***	-1.144***	-1.309***
		(0.219)	(0.254)	(0.106)	(0.127)
Rivalry^2	D	-1.277***	-1.717***	1.016***	1.141***
		(0.298)	(0.348)	(0.140)	(0.166)
Inside opposition	V	0.181***	0.162***	-0.213***	-0.231***
		(0.037)	(0.042)	(0.018)	(0.021)
Opposition intensity	V	0.016*	0.019***	-0.022***	-0.028***
		(0.008)	(0.005)	(0.003)	(0.004)
Oppositions	V	0.097***	0.127***	-0.082***	-0.095***
		(0.015)	(0.024)	(0.007)	(0.009)
Seniorities	D	-0.023**	-0.293***	0.014***	0.025***
		(0.008)	(0.066)	(0.003)	(0.005)
Leaders words	D	-0.161***	-0.154***	0.068***	0.076***
		(0.026)	(0.030)	(0.013)	(0.015)
Followers words	D	0.042	0.064*	0.091***	0.106***
		(0.029)	(0.029)	(0.011)	(0.013)
Goods & services		-0.034***	-0.206***	-0.013***	-0.105***
		(0.004)	(0.026)	(0.002)	(0.012)
Follower size		-0.001***	-0.001**	0.000	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)
Dummy 13		0.107**	0.160***	0.292***	0.254***
		(0.034)	(0.039)	(0.035)	(0.046)
Dummy 46				0.152***	0.249***
				(0.038)	(0.062)
Levenshtein 13	R			0.559***	0.617***
				(0.112)	(0.129)
Levenshtein 46	R			0.768***	0.997***
				(0.124)	(0.162)
Adjudicated 13	R			0.179***	0.211***
				(0.015)	(0.018)
Adjudicated 46	R			0.286***	0.359***
				(0.015)	(0.019)
Low stakes				-0.011***	-0.033***
				(0.001)	(0.003)
Opposition lag	G			0.002***	0.001*
				(0.000)	(0.000)
Leader size				0.006***	0.010***
				(0.000)	(0.001)
Year dummies		Yes	Yes	Yes	Yes
Constant		-1.026***	-0.796***	-1.332***	-1.214***
		(0.160)	(0.183)	(0.049)	(0.062)
$-\ln L$		5079.34	4968.86	18710.74	18611.7

Standard errors in parentheses: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Table 9: Independent probit models for outcomes of and selection into adjudication

	Pr(Leader wins)		Pr(Adjudication)	
Independent variable	**Homoskedastic** (1)	**Heteroscedastic** (2)	**Homoskedastic** (3)	**Heteroscedastic** (4)
Variance equations for heteroscedastic specifications				
Rivalry dummy		0.295*		
		(0.131)		
Opposition intensity		-0.039***		
		(0.011)		
Seniorities		0.134***		
		(0.026)		
Oppositions		0.059		
		(0.031)		
Goods & services		0.103***		0.051***
		(0.012)		(0.005)
Followers words		-0.143***		
		(0.043)		
Follower size		0.000		
		(0.000)		
Opposition lag				0.002**
				(0.001)
Leader size				0.003***
				(0.000)
Dummy 46				-0.163**
				(0.051)
N	8184	8184	42433	42433

Standard errors in parentheses: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

All models reported include the measure of product market rivalry between leader and follower, *Rivalry*. This measure is not available for followers facing a leader who has not applied for a trademark at the Office. The *Rivalry dummy* indicates whether an leader has not applied for a trademark at the Office.[25] This variable is never significant, indicating that there is no significant difference between leaders that have not applied for trademarks themselves and those that have. Additionally, all models include a quadratic specification of the effects of *Rivalry*. In the outcome equation ((3) in Table 10) the overall effect of this variable is positive even one standard deviation above the mean.

Hypothesis 1 states that increases in the expected damage from the follower's trade mark will raise the probability that the Office reject the application. The coefficients and marginal effects for the string similarity measures (*Levenshtein, Jaro Winkler*) and for *Rivalry* which measure the expected damage from registration of the follower's trade mark are significant and positive in the outcome equation (3). The coefficients and marginal effects of variables which capture a reduced level of damage to the leader's trade mark (*Seniorities, Follower's words, Leader's words*), are all significant and negative save *Follower's words* where the marginal effect is not significant. Therefore Hypothesis 1 is confirmed.

Hypothesis 2 states that leaders with more valuable trade marks are more likely to win in adjudication. Coefficients on the value measures for the leader's trade mark (*Inside opposition, Opposition intensity, oppositions*) are all highly significant and are positive in the outcome equation. Only the marginal effect for *Opposition intensity* is not significant. These results are

[25] At the selection stage 3503 (8.25%) of opposition cases are brought by leaders who have not applied for trademarks at the Office. At the outcome stage 792 of these cases remain. This corresponds to 9.67% of all cases.

consistent with Hypothesis 2.

Turn now to the hypotheses about selection into adjudication. Hypothesis 3 states that increases in the leader's probability of winning in opposition reduce the probability of observing adjudication. In the selection equation of the sample selection model (4), all components of the damage ($\mathbf{D}$) and value ($(\mathbf{V})$) vectors entering the outcome equation as components of the leader's probability of winning switch signs. In case of *Follower's words* this is not true, but the marginal effect of this variable is not significant in the outcome equation. Therefore, the results support Hypothesis 3.

Hypothesis 4 states that adjudication will be more likely if the firms' costs of adjudication are lower. In case of the leader costs will be lower on average if they previously opposed trade marks and did not settle. Then, the leader has experience of opposition and possibly evidence pertinent to the current case which lowers their costs. The data show that coefficients and marginal effects for the leader's propensity to prefer adjudication to settlement in the first three (*Adjudication 13*) and the fourth to sixth (*Adjudication 46*) opposition cases are indeed positive and significant.

Turn now to the follower: they may anticipate higher costs of adjudication if the leader has been more aggressive in past opposition cases. The significant positive marginal effects for *Levenshtein 13* and *Levenshtein 46* show that adjudication is more likely if a leader opposed word marks with greater similarity in the past. Conversely, opposition cases are more likely to settle if the leader has opposed word marks with a lower average similarity in the past. This can be explained in two ways: either such a leader was overoptimistic about the strength of their word marks in the past and is more likely to settle now, or they have acquired a reputation for aggressive opposition and this leads to a higher propensity to settle on the part of followers they face. The first explanation does not fit in well with evidence that leaders' propensity to prefer adjudication persists as is evident from the positive effects of *Adjudication 13* and *Adjudication 46*. Additionally, the strong positive coefficient on *Levenshtein 46* would then indicate that overoptimism only dissipates after six opposition cases have already been brought. This is highly unlikely. Therefore, the positive marginal effects for *Levenshtein 13* and *Levenshtein 46* show that followers do indeed take into account how aggressive a leader has been in past opposition cases.

The marginal effects for *Levenshtein 13* and *Levenshtein 46* show that these effects are important. The probability that an opposition case is settled increases by 0.12 and 0.19 if the leader opposes trade marks that are one standard deviation less similar at the mean. To put this effect into perspective note that the average similarity measured by the Levenshtein algorithm of trade marks in opposition decreased from -.137 to -.275 for Sony from -0.037 to -0.100 for Microsoft and increased from -0.227 to -0.121 for Mars and -0.137 to -0.067 for Pfizer. In the case of Sony the reduced similarity of trade marks in opposition cases four five and six leads to an increase in the probability of settlement of 0.026 for later opposition cases.

Hypothesis 5 states that a leader will be less likely to settle if they expect a large reputation gain from an opposition case. The frequency of opposition as measured by *Opposition lag* will increase if a leader is building a reputation for toughness in opposition. The coefficient on this variable has the predicted positive effect on the probability of observing adjudication. The coefficient and marginal effect are significant. The finding supports Hypothesis 5.

As this discussion shows the theoretical model receives strong support from the empirical results. Additionally, the results indicate that the effect of reputation on the outcomes of trade mark opposition are of a magnitude that is non negligible.

Table 10: Sample selection models for outcomes of and selection into adjudication

		Homoscedastic specification		Heteroscedastic specification	
Independent Variable		Pr(Leader wins) (1)	Pr(Adjudication) (2)	Pr(Leader wins) (3)	Pr(Adjudication) (4)
Levenshtein	D	1.029***	-0.300***	1.058***	-0.410***
		(0.112)	(0.055)	(0.123)	(0.068)
Jaro Winkler	D	0.588***	-0.043	0.527***	-0.032
		(0.121)	(0.060)	(0.116)	(0.076)
Rivalry dummy	D	-0.043	0.009	-0.144	0.027
		(0.049)	(0.027)	(0.088)	(0.033)
Rivalry	D	0.575*	-1.145***	0.850***	-1.390***
		(0.229)	(0.106)	(0.226)	(0.138)
Rivalry^2	D	-1.027***	1.016***	-1.364***	1.232***
		(0.305)	(0.140)	(0.303)	(0.186)
Inside opposition	V	0.134***	-0.213***	0.120**	-0.246***
		(0.039)	(0.018)	(0.037)	(0.023)
Opposition intensity	V	0.010	-0.022***	0.021***	-0.029***
		(0.008)	(0.003)	(0.005)	(0.004)
Oppositions	V	0.079***	-0.081***	0.092***	-0.102***
		(0.016)	(0.007)	(0.017)	(0.009)
Seniorities	D	-0.019*	0.014***	-0.267***	0.029***
		(0.008)	(0.003)	(0.054)	(0.006)
Followers words	D	0.054	0.085***	0.101***	0.112***
		(0.028)	(0.015)	(0.029)	(0.018)
Leaders words	D	-0.142***	0.068***	-0.132***	0.082***
		(0.026)	(0.013)	(0.027)	(0.016)
Goods & services		-0.035***	-0.013***	-0.214***	-0.131***
		(0.004)	(0.002)	(0.025)	(0.011)
Follower size		-0.001***	0.000	-0.000***	0.002***
		(0.000)	(0.000)	(0.000)	(0.000)
Dummy 13		0.112***	0.294***	0.147***	0.263***
		(0.034)	(0.035)	(0.035)	(0.048)
Dummy 46			0.150***		0.096
			(0.038)		(0.050)
Levenshtein 13	R		0.556***		0.632***
			(0.111)		(0.144)
Levenshtein 46	R		0.756***		1.029***
			(0.124)		(0.167)
Adjudicated 13	R		0.180***		0.226***
			(0.015)		(0.020)
Adjudicated 46	R		0.286***		0.372***
			(0.015)		(0.020)
Low stakes			-0.010***		-0.034***
			(0.001)		(0.002)
Opposition lag	G		0.002***		0.001
			(0.000)		(0.000)
Leader size			0.006***		0.011***
			(0.000)		(0.000)
Year dummies		Yes	Yes	Yes	Yes
Constant		-1.368***	-1.284***	-0.979	1.159***
		(0.183)	(0.085)	(0.177)	(0.108)
ρ		0.236**		0.201**	
		(0.081)		(0.068)	

$-\ln L$	23784.45	23563.23

Standard errors in parentheses: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Table 11: Variance equations of the sample selection model including heteroscedasticity

Independent Variable	Pr(Leader wins) (1)	Standard errors	Pr(Adjudication) (2)	Standard errors
Rivalry dummy	0.267*	(0.113)		
Opposition intensity	-0.035**	(0.012)		
Seniorities	0.117***	(0.021)		
Goods & services	0.099***	(0.010)	0.055***	(0.004)
Followers words	-0.144***	(0.040)		
Opposition lag			0.002*	(0.001)
Leader size			0.003***	(0.000)
Follower size			0.001***	(0.000)

Standard errors in parentheses: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

All reported specifications include time dummies. The reference year in each case is 2001. The marginal effects indicate that in the outcome equation there was a significant increase in the probability that leaders won opposition cases after 2001. This coincides with a reorganisation of the opposition process at the Office.

Table 12: Marginal effects for selection into - and outcome of adversarial proceedings

	Pr(Leader wins)		Pr(Adjudication)	
Independent	Marginal effect	Standard errors	Marginal effect	Standard errors
variable	(1)	(2)	(3)	(4)
Levenshtein	0.385***	(0.039)	-0.076***	(0.010)
Jaro Winkler	0.184***	(0.039)		
Rivalry dummy	0.014	(0.022)	0.004	(0.006)
Rivalry*	0.123*	(0.058)	-0.184***	(0.016)
Inside opposition	0.052***	(0.012)	-0.043***	(0.004)
Opposition intensity	0.000	(0.003)	-0.005***	(0.001)
Seniorities	-0.065***	(0.013)	0.005***	(0.001)
Oppositions	0.037***	(0.005)	-0.018***	(0.002)
Followers words	0.005	(0.010)	0.021***	(0.003)
Leaders words	-0.049***	(0.009)	0.015***	(0.003)
Goods & services	-0.048***	(0.004)	-0.008***	(0.001)
Dummy 13	0.040**	(0.012)	0.048***	(0.009)
Dummy 46			0.013	(0.011)
Levenshtein 13			0.120***	(0.025)
Levenshtein 46			0.193***	(0.031)
Adjudicated 13			0.041***	(0.003)
Adjudicated 46			0.070***	(0.004)
Low stakes			-0.006***	(0.000)
Opposition lag			0.001***	(0.000)
Follower size			-0.000	(0.000)
Leader size			0.003***	(0.000)

Standard errors in parentheses: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

* The marginal effects for *Rivalry* take into account the quadratic functional form for this variable.

6 Conclusion

In this paper I study opposition to trade mark applications. The process of opposition to a new trade mark can be thought of as a form of litigation: a firm already owning a trade mark (the leader) opposes the registration of a new trade mark by another firm (the follower).

Trade mark opposition has not been studied by economists before. It is interesting for three reasons: (i) trade marks are an important intellectual property right that has received very little attention in the economics literature; (ii) trade mark opposition is very similar to litigation which makes it interesting to test theories of litigation in this context; (iii) as in the case of patent opposition and litigation, trade mark opposition frequently pits the same leader against a sequence of followers. This means that leaders have the opportunity to build reputations. Studying the formation and consequences of leaders' reputations is therefore an additional motive for the study of trade mark opposition.

This paper is based on a very rich administrative dataset of trade mark opposition at the Office for the Harmonisation of the Internal Market (the Office) which administers the Community Trade Mark (CTM). The paper shows that trade mark opposition at the Office is comparatively frequent and poses a significant risk to new followers. I find that specific firms oppose new trade mark applications with great frequency. Furthermore, I find that firms which have opposed more often in the past benefit by successfully opposing less similar trade marks than other firms, i.e. they enjoy a larger degree of protection. These firms also benefit by extracting settlements more frequently.

I investigate whether the observed patterns of settlement and adjudication can be explained by existing theories of divergent expectations or asymmetric information. This paper shows that neither theory explains these patterns well. To show this I employ measures of string similarity which measure the quality of trade mark opposition cases. These measures provide information about the quality of opposition cases that is not available in most other datasets on litigation or opposition. Using these measures I find that a leader's reputation for toughness in past opposition cases increases the probability that current trade mark cases brought by this firm will be settled. These measures also capture some of the similarity between trade marks which is relevant to the decisions of the Office when they decide trade mark opposition cases.

Adjudication of trade mark opposition cases is explained using a model of bargaining in which followers have expectations about the ability of leaders to support their case well. These expectations reflect leaders' reputations for tough opposition. The theoretical model developed in the paper shows that firms building reputations for tough opposition will be less likely to settle trade mark disputes. The model yields a structural empirical specification in the form of a sample selection model. In estimating this model I allow for heteroscedasticity at both the outcome and the selection stages of the model. The results show that a reputation for tough opposition in early opposition cases at the Office has a strong impact on the probability that subsequent opposition cases are settled. The model also provides evidence for selection into adjudication of trade mark disputes. Allowing for heteroscedasticity is also shown to be important.

Given that reputations help owners of large trade mark portfolios to protect these against infringement the question arises what implications this has. In the context of patent litigation it has been argued that the bias against small firms that results from reputation building by large firms may reduce welfare. Reputation erects barriers to entry for smaller patent applicants who may possess very valuable innovations. In the case of trade marks it is less obvious that a reputation for tough opposition is detrimental to welfare. Economics lacks theories which explain how an optimal trade mark system should work. Such theories would provide the basis to analyse the effects of reputation in trade mark opposition. This is a challenge for future work on trade marks.

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Appendix A: String similarity measures

Above the Levenshtein - and the Jaro Winkler measure as defined by Cohen et al. (2003) are used. The Levenshtein measure is an *edit distance* measure which determines similarity of strings through the number of insertions (i), deletions (d) and replacement (r) operations needed when transforming one string into another. For an in depth explanation of the algorithm and its implementation refer to Gusfield (1997). The Jaro Winkler measure is a metric which captures number and order of common elements shared by two strings. It is based on the work of Jaro (1995) and Winkler (1999) and implemented according to Cohen et al. (2003).

The Levenshtein algorithm Consider the two hypothetical trade marks (s) RESSVETIN and (t) RESVRIN. The following example demonstrates how string (s) is transformed into string (t) by insertion of two letters and the deletion of two others:

String s	R	E	S	S	V	E		T	I	N
String t	R	E	S		V		R		I	N
Operation	c	c	c	d	c	i	d	i	c	c
Cost	0	0	0	1	0	1	1	1	0	0

In this example three operations are used: insertion (i) and deletion (d), each of which has a cost of 1 and copying (c) which is costless. The Levenshtein measure for this example is -4. The maximum value of the Levenshtein algorithm for a given pair depends on the length of the longer string in the pair. To make the measure comparable across strings it is divided by the length of the longer string in a pair. In this case the result is -0.4. Two strings are identical if the measure has the value 0 and maximally dissimilar if it has the value -1.

To deal with multiple words and similarity which is due to parts of a trade mark I use a level two distance function as defined by Cohen et al. (2003) which calculates the similarity for all combinations of words from both trade marks and uses the maximum of the calculated similarities, discarding all remaining information. The results may differ from the Levenshtein algorithm in those cases in which at least one of the trade marks in a pair consists of multiple words.

The Jaro Winkler algorithm This algorithm is based on the number of similar elements in two strings and their order. Define as s' the number of common elements of strings (s) and (t) in string (s) and similarly as t' the number of common elements in string (t). Then define T as the number of transpositions of common elements in (s) and (t). Finally define P as the length of the longest common prefix of (s) and (t). The Jaro Winkler metric is then defined as:

$$\text{Jaro Winkler}(s,t) = \frac{1}{3}\left(\frac{s'}{s} + \frac{t'}{t} + \frac{s'-T}{s'}\right) + \frac{\max(P,4)}{10}\left[1 - \frac{1}{3}\left(\frac{s'}{s} + \frac{t'}{t} + \frac{s'-T}{s'}\right)\right] \tag{A1}$$

by Cohen et al. (2003). They note that this measure works well for short strings such as personal last names. I also implement this measure as a level two distance function in the sense of Cohen et al. (2003) to deal with multiple words in a trade mark. The measure lies in the interval $[0,1]$, with a value of 1 indicating absolute similarity and 0 indicating maximal dissimilarity.

In the example provided above the measure produces a value of 0.903. The Jaro Winkler measure gives more weight to pairs of trade marks that are similar at the beginning. This feature means that it is a useful complement to the Levenshtein measure for which it is unimportant where similarity between two strings occurs.